BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

VOL. 15.] December 1, 1927. [No. 4.

DISEASES DUE TO PROTOZOAN PARASITES.

NIESCHULZ (Otto). Zoölogische bijdragen tot het surraprobleem. XI. Enkele proeven met *Haematopota truncata* **Schuurm. Stekh.**, *H. irrorata* **Macq. en** *Tabanus brunnipes* **Sch. Stekh.** [**The Surra Problem. Experiments with** *Haematopota truncata, H. irrorata,* **and** *Tabanus brunipes.*]—*Veeartsenijkundige Mededeeling. No. 61. Departement van Landbouw Nijverheid en Handel-Ned.-Indië,* 13 pp. With 3 text figs. 1927. Archipel Drukkerij-Buitenzorg.

In the early part of this year, during a fly survey in Sumatra, some surra transmission experiments were carried out with *H. truncata, H. irrorata,* and *T. brunipes,* flies which up till then had not been known to act as carriers of surra.

The first of these was used in three experiments. Direct transmission from a naturally infected horse to another horse and some guineapigs failed. Direct transmission from horse to horse (with 25 flies) was successful. With an interval of half-an-hour transmission from horse to guineapig failed.

With *H. irrorata* two experiments were carried out. An infected dog and guineapigs were used. Fifteen flies were used in each experiment and the transmission was direct. In one case the result was positive and in the other negative.

Five *Tabanus brunipes* transmitted the infection from an infected dog to two guineapigs.

KASAI (Kakuya) & AKAZAWA (Sasao). **The Prophylactic Action of "Germanin" ("Bayer 205") against Experimental Infection with a Trypanosome of the Formosan Water-Buffalo.**—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. I. p. 1095–1096.

Only a summary of the authors' experiments is given in this paper. Mice injected subcutaneously with ·005 g. of "Germanin" were protected against inoculation with the trypanosome causing the surra-like infection of water buffaloes for about 5 months. After this the resistance declined. Experiments with optochin, trypaflavin, trypanblue, tartar emetic, neotrepol, atoxyl, neosalvarsan, and silver salvarsan in doses approximately to half the tolerated dose showed that these drugs exercised little or no effect.

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With progressively smaller doses of " Germanin " the effects were progressively less marked, until at ·00001 g. the drug does not protect mice. Calves injected with 1 gramme are protected for about 3 months. The same dose given to horses is not protective, but the course of the disease is prolonged. This is the case even when the infective inoculation is given four months after the drug. It is to be noted that no information is given as to whether the doses referred to are absolute quantities or whether they are related to the body weight.

" Germanin " in doses of 4 g. per 100 kg. did not exercise any inhibitory action upon the development of rinderpest.

KAZANSKY (J. J.). Sur la résistance du *Trypanosoma equiperdum* vis-à-vis du " Bayer 205 " (Naganol). [**The Resistance of** *T. equiperdum* **to " Bayer 205 ".**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 413–415.

Following other investigators the author has tested the persistence of drug-resistance during passage through guineapigs.

The strain of trypanosomes used was obtained from a horse infected with dourine which had relapsed after treatment with " Bayer 205."

In this way the strain has been passed through eight passages utilizing 22 guineapigs.

The drug was administered subcutaneously in doses of 0·015 and 0·04 g. per kilo as a 1 per cent. solution in saline, and the doses have been repeated at intervals ranging from 9 to 60 days. In no case was a positive result obtained. Other guineapigs and rats were used as inoculation controls.

HALL (G. N.). Action de l'halarsine et du bisantol dans le traitement des trypanosomiases des bovins et caprins. [**Halarsin and Bisantol in the Treatment of Trypanosomiasis of Cattle and Goats.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 535–545.

The author has tested " Halarsine " against *T. congolense* and *T. vivax*, the most important animal trypanosomes of Uganda.

In every case intravenous injection was resorted to, and the results controlled by daily examination of fresh and stained blood preparations. It is stated that the examination of centrifuged blood and cerebro-spinal fluid has also been resorted to.

Halarsine is said to be 4 oxy-3 amino-phenyldichlorarsine. Some samples were pale pink and others quite white. The powder was soluble in hot or cold water yielding a slightly acid solution. As is usually the case great care must be exercised in introducing the drug into the vein because it is irritant in subcutaneous tissue.

Experimental dosages showed that a safe dose for an animal weighing about 225 kg. was 2 g. (in 30 cc. of water). But this dose may apparently produce acceleration of respiration, contractions of the facial muscles, inability to rise, and attempts at vomition. The symptoms pass off in about half-an-hour.

A single injection into an ox infected with *T. congolense* caused a disappearance of trypanosomes in about 20 hours, but they reappeared in a week.

In a second case 4 injections were given, as trypanosomes appeared again in the circulation. The intervals of freedom from trypanosomes

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were progressively shorter. After the fourth injection there was considerable swelling of the neck. An attempt was made to save the animal's life by tartar emetic injections, but without success.

A second animal treated in a similar way failed to recover. Failures are also recorded in attempts to treat cattle and goats infected with *T. vivax*. In no case was the circulation cleared for periods exceeding 15 days, and there was always a risk of producing serious lesions as a result of the drug gaining access to the subcutaneous tissues.

It is noted that in every case treated the introduction of the drug into the circulation was followed by an increase in the number of trypanosomes, and in two cases they actually made their appearance there when the blood had apparently been negative before treatment was begun. The results of a succession of injections appeared to indicate that the drug is excreted slowly and that intoxication may result.

Bisantol contains 47·5 per cent. bismuth and 13·6 per cent. antimony. It is readily soluble in water and may be sterilized by boiling without decomposition. It is as toxic as tartar emetic subcutaneously but far more toxic when given intravenously.

Bisantol was used in a 4 per cent. solution and 5 cc. of this was found to be a poisonous dose for a goat.

Bovines weighing 90 kg. stood doses up to 16 cc., but larger doses produced symptoms of intoxication. In an animal infected with *T. congolense* and treated with bisantol relapse occurred on the 6th day. A second dose given on the 12th day failed to clear the circulation and a third dose of 16 cc. on the 16th day proved fatal. Similar results were obtained with two bovines infected with *T. vivax*, and with three goats.

CARMICHAEL (J.). **Rinderpest Serum and the Pathogenicity of** *Trypanosoma theileri*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Nov. Vol. 20. No. 4. pp. 303–304.

After referring to the opinion generally held that *T. theileri* is of little importance as a parasite of cattle the author gives brief details of fourteen animals used for the preparation of anti-rinderpest serum at the field laboratory Arua, West Nile District of Uganda.

Of these nine died and five survived. It is suggested that the trypanosome was transmitted by the inoculation with virulent rinderpest blood in the process of simultaneous inoculation. The thermal reactions following were those normal to rinderpest, but it would appear that the febrile reaction reduced the resistance of the animals to this parasite which ordinarily is not pathogenic.

CERNIANU (C.). Rinderbabesiellose in Bessarabien und ihre erfolgreiche Behandlung mit Hexamethylentetramin. [**The Successful Treatment of Bovine Babesiellosis with Hexamethylenetetramine in Bessarabia.**]—*Berlin. Tierärzt. Woch.* 1927. May 27. Vol. 43. No. 21. pp. 343–345.

The author explains that up to the present no investigations have been made in Bessarabia regarding the type or types of parasites found in the red corpuscles of cattle, but JAKIMOFF and WASSILEWSKY have suspected that Babesiella is endemic there, and that possibly *B. bigeminum* also occurs.

The occurrence of *P. caballi* was established in 1923, the transmitting agent being *D. reticulatus* and the author has seen cases (1925) of infection in cattle with *B. bovis*.

Bones were frequently sent to him as being those of suspected cases of anthrax, but as negative results were frequently obtained he examined smears of marrow after removal of the fat, and found *Babesiella bovis* to be present.

Later he has been able to find the parasite in blood smears and smears from organs.

The parasites usually occupy a marginal position and the individuals of the twin organisms are disposed at a wide angle to each other. On an average 30 to 40 per cent. of the corpuscles are invaded, but occasionally 70 per cent. or more contain parasites.

The transmitting agent is *Ixodes ricinus*.

Dullness, diarrhoea, colic, anaemia, and haemoglobinuria are constant symptoms. When recovery takes place convalescence is slow.

The lesions are those general to severe acute anaemia. The spleen is enlarged—sometimes to twice the normal size. The liver is enlarged, the gall-bladder distended, the kidneys are haemorrhagic, and the bladder sometimes contains dark red urine, but is often quite empty.

For treatment the author used hexamethylenetetramine in 40 per cent. solution, injected subcutaneously. Forty to fifty cubic centimetres were given at a dose and two doses were given daily. Cases treated early, that is to say when there was only elevation of temperature and diarrhoea, were cured by two doses, but even marked cases recovered after treatment for 3 or 4 days at the most.

IAKIMOFF (W. L.) & BELAVIN (W. S.). Espèce nouvelle du Babesiella en Russie. [**New Species of Babesiella in Russia.**]—*Russian Jl. Trop. Med.* 1926. No. 8. p. 51. [Authors' French Abstract.]

The authors have detected a parasite in the blood of a cow in the Northern Caucasus which resembles *B. bovis* morphologically, but which differs from that parasite in that it is centrally placed in the corpuscles. It also resembles *Babesiella berbera* (Sergent). The name *Babesiella caucasica* n. sp. is suggested.

YAKIMOFF (W. L.), MARKOFF-PÉTRASCHEWSKY (E. N.) & RASTÉGAÏEFF (E. F.). Sur l'hémoglobinurie au cours de la babésiellose bovine. [**Haemoglobinuria caused by Bovine Babesiellosis.**]—*Bull. Soc. Path. Exot.* 1927. May. Vol. 20. No. 5. pp. 415–418.

The authors summarize briefly the attempts which have been made by investigators to explain the liberation of haemoglobin during attacks of piroplasmosis. They believe that the liberation is in some way connected with the multiplication of the parasites in the blood and this they think, with NUTTALL and GRAHAM-SMITH, is by a process of budding.

During the summer of 1926 they immunized some 200 animals against *Babesiella bovis* by infecting them and treating them with trypanblue. The blood of the animals was examined regarding the types of parasites present and this was correlated with the presence of haemoglobinuria.

The results are set out in tabular form. They find that from the examination of the blood of 172 animals 145 showed annular forms of parasites and of these 1·3 per cent. had haemoglobinuria, 16 showed a mixture of annular and pyriform parasites and of these 43·7 per cent. had haemoglobinuria, 11 showed pyriform parasites, of which 9 or 81·8 per cent. had haemoglobinuria. They conclude that the haemoglobinuria is connected with the arrival of the parasite at the pyriform stage.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Les maladies à protozoaires des animaux domestiques en Crimée. [**The Diseases of Domesticated Animals due to Protozoa encountered in the Crimea.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 418–419.

Late in 1924 the authors visited the Crimea for the purpose of investigating the animal diseases there.

Horses.—Dourine was encountered, and during 1924 its occurrence became widely spread. Piroplasmosis was said to occur there, but no cases were actually encountered. Microfilariasis of horses was not seen.

Cattle.—*Piroplasma bigeminum* and *Gonderia mutans* were found.

Neither *T. theileri* nor microfilaria were found in the blood of some of the 46 animals examined.

Coccidia were not detected in the faeces.

Camels.—There are only about a hundred camels in the Crimea. It is not stated how many blood examinations were made, but no parasites were found. Similarly, none were found in the blood of sheep and pigs. Five out of 13 of the latter were found to harbour *Eimeria debliecki*.

No piroplasms were found in 16 dogs, but there was one case of leucocytogregrarine infection and 6 of microfilariasis. Although a small number of domesticated birds were examined without the detection of spirochaetes, the authors believe that the disease occurs. A leucocytozoon was found in one turkey, and this may have been the cause of a recent epizootic.

CARPANO (M.). Le infezioni da emoprotozoi endoglobulari dei bovini in Italia. [**The Intra-Corpuscular Parasites of Bovines in Italy.**]—*La Clin. Vet.* 1927. July. Vol. 50. No. 6. pp. 389–400.

In this preliminary note the author gives a classification of the intra-corpuscular parasites of bovines and figures and describes briefly *Piroplasma bigeminum*, *Babesiella bovis*, *Gonderia mutans*, and *Anaplasma marginale*. In each case a few lines of description of the epizootiological data, the morphology of the parasite, the symptoms, and lesions are given.

VICREY. Les piroplasmoses atypiques. [**Atypical Piroplasmoses.**]—*Ret. Vét. et Jl. Méd. Vét.* 1927. July. Vol. 79. pp. 373–387.

The author describes cases of piroplasmosis which are atypical in their clinical manifestations. The paper is divided into two parts, the first delineating briefly the classical symptoms of the various forms of piroplasmosis—using the term in a general sense, and the second

containing accounts of specific cases in which the clinical symptoms were of an unusual character. In each case the diagnosis was made at the Pasteur Institute (presumably in Algiers).

ADLER (S.) & THEODOR (O.). **The Transmission of *Leishmania tropica* from Artificially Infected Sandflies to Man.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 89–104. With 3 plates and 2 text figs.

"Out of 28 attempts to transmit cutaneous leishmaniasis to man from artificially infected sandflies six gave positive results.

"The successful experiments were carried out with *L. tropica* which had developed eight days or more in *P. papatasii*. Nine experiments with *L. tropica* which had developed from 2 to 7 days in *P. papatasii* all gave negative results during an observation period of 5 to 15 months."

ADLER (S.) & THEODOR (O.). **The Behaviour of Cultures of Leishmania sp. in *Phlebotomus papatasii*.**—*Ann. Trop. Med. & Parasit.* 1927. July. Vol. 21. No. 2. pp. 111–134. With 2 plates and 3 text figs.

A detailed description is given of the means employed for feeding sandflies on culture. Essentially, this comprises two glass tubes, one for the culture and the other for the sandflies. The intercommunication between the two is covered with a piece of shaved rabbit skin through which the flies feed.

P. papatasii was infected experimentally in this way with cultures of *L. tropica*, *L. braziliensis*, and two strains of *L. infantum*. The cultures of *L. tropica* behaved in the flies exactly like parasites taken from natural sores. The culture forms of *L. tropica* acquired an exalted virulence by passage through sandflies.

Cultures of *L. infantum* (Paris strain) behaved similarly to *L. tropica* in *P. papatasii*. *L. braziliensis* and *L. infantum* (London strain) infected the stomach of the sandfly only.

PATTON (W. S.) & HINDLE (E.). **The Development of Chinese Leishmania in *Phlebotomus major* var. *Chinensis* and *P. Sergenti* var.**—*Proc. Roy. Soc.* 1927. May 2. Vol. 101. Series B. No. B 710. pp. 369–390.

Infected hamsters have been used as the source of infection of the flies. Negative results following experiments with human patients are explained by the extreme rarity of the parasites in the peripheral blood. When ingested by the flies the flagellates attach themselves in the mid gut and extend forwards, reaching the buccal cavity about the 6th day. The sandfly appears to remain infected for the duration of its life (10–12 days). It appears to be probable therefore that *P. major* var. *chinensis* is concerned in the transmission of the parasite in China.

With *P. sergenti* different results were obtained. The flagellates could be obtained in the midgut of the flies fed upon infected hamsters, but they appeared to die out in about four days unless the flies were re-fed. There was no development in the forward direction towards the buccal cavity. The flagellates were found in the broad posterior part of the midgut. The fly appears to be less likely to act as a vector, but it should not be entirely ignored.

DISEASES DUE TO METAZOAN PARASITES.

BLACKLOCK (D. B.) & GORDON (R. M.). **The Experimental Production of Immunity against Metazoan Parasites and an Investigation of its Nature.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 180–224. With 1 plate and 2 text figs.

This paper deals with the investigation of the immunity which can be produced in guineapigs against the larvae of *Cordylobia anthropophaga*. It is divided into the following sections: (1) Introduction, (2) Technique, (3) The experimental production of metazoan immunity, (4) An investigation into the spread and persistence of immunity, (5) The nature of the immunity, (6) The immunity is a true immunity and not due to damage or athrepsis, (7) The immunity is a solid immunity, (8) Anaphylaxis, (9) Attempts to produce immunity by various skin treatments, (10) Summary and conclusions.

The authors believe that they have furnished proof of the existence of an acquired immunity which conforms to the following definition—" an immunity acquired as the result of previous infection or vaccination and involving the death of the metazoan parasite in the host within a specified time."

The idea of acquired immunity against metazoan parasites is not new but experimental proof of its existence is conspicuous by its more or less complete absence. In their experiments the authors do not deal with immunity resulting from age of the host.

The parasite used was *Cordylobia anthropophaga* and the host immunized was the guineapig. This type of immunity was shown to be capable of being produced by BLACKLOCK & THOMPSON in 1923.

The immunity is at first confined to areas of skin into which the parasite has previously penetrated or which have been vaccinated with larvae or emulsions of larvae. It appears that the specific immunity resides, so to speak, in the skin itself, since the majority of the larvae placed upon a protected animal are dead before they have penetrated the deeper tissues.

The immunity appears to spread from the site of penetration or vaccination to the rest of the skin. It lasts for three months and possibly longer. It is reproduced in new skin growing over an abraded immune area, but it does not persist in portions of immune skin removed and kept in vitro. There appeared to be no constant association between immunity and eosinophilia. No toxic or anaphylactic symptoms have been observed, nor has there been any visible reaction from the application of emulsions of larvae to the conjunctiva or skin of either immune or non-immune animals. Only a few experiments have been carried out with emulsions of larvae, and in these 1 out of 3 animals acquired immunity. Results were better when larvae were allowed to penetrate and were at once removed, and still better (although the number of tests is smaller) when the larvae were allowed to remain for 48 hours and were then killed.

LEGG (John). **Note on the Infestation of Sheep with Ticks.**—*Australian Vet. Jl.* 1927. Mar. Vol. 3. No. 1. pp. 12–14.

During a drought in Queensland last year sheep were moved down from areas where the cattle tick, *B. australis*, has never been seen to " cattle " country near the coast. There many of them have become

infested with the tick. As the sheep will be moved back to the sheep ground the problem arises as to what should be done regarding the infestation. It is the author's opinion that no steps need be taken as the tick will not survive the conditions prevailing in the sheep country. Had the country been suitable for the tick it would have appeared there long ago.

Ixodes holocyclus, or scrub tick, has caused serious losses among flocks sent to the Atherton Tableland. Sheep usually go down with paralysis four to six days after the attachment of the female tick, and if the ticks are not removed death takes place about the 8th day. If the ticks are removed when weakness is first noticed there is a chance of recovery. The tick usually attaches itself about the face. Ticks identified as *Haemaphysalis leachi* (?) were found on some sheep near Townsville.

STEWART (M. A.). **A Means of Control of the European Hen Flea (*Ceratophyllus gallinae*, Schrank).**—*Jl. Econ. Entomol.* 1927. Feb. Vol. 20. No. 1. pp. 132–134.

This paper states that a proprietary disinfectant prepared in the United States is effective for the destruction of the hen flea. No information is given regarding the nature or composition of the disinfectant.

WRIGHT (W. R.). **A Note on mounting Media for Parasitological Materials.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 179–180.

The author has used Euparal for mounting nematodes and insect genitalia with fairly good results. The specimens are transferred from 70 per cent. alcohol to phenol, and when cleared to Euparal.

For mounting nematodes from 70 per cent. alcohol without clearing in phenol the author uses a medium prepared as follows: Flowers of camphor and pure phenol are mixed in equal parts by weight. This yields a clear oily liquid. To this is added a " thin solution of gum sandarac in iso-butyl alcohol." The strength of this solution is not given. The proportion of phenol added may be varied according to the degree of clearing required. The medium is not recommended for blood films but it is good for haematoxylin and carmine stained specimens. The use of absolute alcohol and a clearing agent is obviated.

FAIRLEY (N. Hamilton). **Studies in the Chemotherapy and Immunity Reactions of Schistosomiasis.** (*Schistosoma spindalis* and *Schistosoma haematobium*).—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Nov. Vol. 20. No. 4. pp. 236–267.

The author found that while intravenous injections of alcohol soluble extracts of cercariae into goats caused an increase in the antibody content of the serum, it exercised no influence on the course of the disease.

In aqueous solutions cercariae survived for three hours in 1 in 200 solutions of tartar emetic and emetine hydrochloride. The presence of

human serum greatly enhanced the destructive power of the drugs, for death took place in the same period in dilutions of 1 in 40,000 to 1 in 160,000. Tartar emetic was found to be capable of effecting a cure in goats infected with *S. spindalis* if doses of 3·9 to 5·5 m.g. per kg. body weight were given daily for 16 to 26 days.

About 50 per cent. of animals regarded as clinical cures were found on postmortem to be still affected, but there was evidence to show that the sex ratio of the parasites had undergone considerable modification. In some of the animals only male parasites were discoverable. The intravenous injection of emetine hydrochloride in doses of 0·7 to 1 mg. per kg. daily for 10 or 15 days was very efficient.

All the experimental animals developed antibody recognizable by complement fixation prior to the commencement of treatment, and in some of these it was found that the reactions became negative in one to four months after treatment was begun.

The fact that human beings who had been clinically cured of the disease by the administration of tartar emetic up to a year previously still gave positive complement fixation reactions suggests that in these the persistence of reaction is due to the survival of male parasites.

KIMURA (T.), TAGUMA (S.) & WADA (Y.). **Pathological Anatomy of the Bronchiectic Cavity of Cattle in Japan** (*Fasciolasis cystica pulmonum* **s.** *Bronchiectasis parasitaria*).—*Sei-I-Kwai Med. Jl.* 1926. Nov. Vol. 45. No. 5. English summary. pp. 1–7. With 2 plates. [In Japanese.]

The authors describe lesions found in the lungs of cattle slaughtered at Tokyo which are characterised by the presence of cavities with fibrous walls, trematodes being occasionally found within them.

The lesions vary in size from a bean to a fist and contain viscid creamy pus which is sometimes partly calcified. The cavities are irregular in shape and communicate with bronchi. The surrounding lung is collapsed or cirrhotic.

Parasites have been found in the smaller cavities but never in the larger ones.

Histological examination showed general cellular infiltration, mucoid degeneration and desquamation of the epithelium. The material in the cavities appeared to be mucus containing large numbers of degenerating leucocytes. There were sometimes layers of macrophages surrounding the mass of mucus. The walls were composed of dense fibrous tissue, and the surrounding tissues were cirrhotic.

A tabular statement shows the number of cases in which trematode invasion of the lungs occurred among cattle slaughtered in 1920.

The parasites are about 15 mm. long by 4–5 mm. in width. Examination of the parasites and eggs leads the authors to think that it is *Fasciola hepatica.*

SEDDON (N. R.). **The Treatment of Liver Fluke in Sheep.**—*Australian Vet. Jl.* 1927. June. Vol. 3. No. 2. pp. 60–63.

The author publishes a few results showing that carbon tetrachloride is an efficient agent. It may be given in liquid paraffin, and there is no need to starve the animals beforehand. One to 2 cc. is effective.

SOUTHWELL (T.). **Experimental Infection of the Cat and the Fox with the Adult** *Echinococcus.*—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 155–163.

The author draws attention to the frequent occurrence of *E. polymorphus* (*E. veterinorum*) in man and animals and the infrequence of occurrence of the *Echinococcus granulosus* (*T. echinococcus*) in dogs.

Evidence is produced that the fox may harbour the mature parasite under natural conditions and that both the fox and the cat can be experimentally infected.

GRANOUILLIT & THU. Sur une forme kystique anormale et rare dûe à *Cysticercus tenuicollis* chez les porcins en Cochinchine. [**An Abnormal Cystic Form of** *Cysticercus tenuicollis* **in Pigs in Cochinchina.**]—*Rev. Vét.* 1927. Aug. Vol. 79. pp. 444–446.

The peritoneal situation of *Cysticercus tenuicollis*, so frequently encountered in Europe, is rare in Indo-china. There the parasites are found embedded in the surface of the liver, but sometimes they are in the depth of the parenchyma of the organ. It was originally thought that such cysts were in reality Echinococcus, but microscopic examination showed that this was an erroneous view. By experiment *Taenia marginata* was produced in a dog.

The parasite is not encountered frequently. Thousands of pigs have been examined, but only about a dozen have been found infested.

LOPEZ-NEYRA (C. R.). Considérations sur le genre *Dipylidium* Leuckart. [**A Review of the Genus** *Dipylidium* **Leuckart.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 434–440

This paper is a detailed survey of the genus and does not lend itself to abstraction. It should be consulted in the original by those interested.

LAGAILLARDE. Contribution à l'étude des parasites intestinaux chez le cheval. Strongles, Oxyures, Ascaris. [**The Intestinal Parasites of the Horse, Strongyles, Oxyuris, and Ascaris.**]—*Rev. Vet.* 1927. Aug. Vol. 79. pp. 429–431.

For the treatment of horses infested with Strongyles and Oxyuris the author recommends

Turpentine	100 to 125 g.
Chloroform	20 to 25 g.
Castor Oil	300 g.

This is the dose for a horse weighing from 370 to 400 kilos. To hasten the passage of the medicine through the intestine he advocates immediately after administration an injection of pilocarpine, or, better still, arecolin.

MIYAMOTO (T.). **On Diarrhoea of Young Pigs in Formosa caused by** *Strongyloides suis ?*—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa.* 1927. Feb. No. 263. p. 3. [Author's English Abstract.]

The author found larval nematodes in the faeces of young pigs suffering from diarrhoea which he believed to be those of *Strongyloides suis.*

KOSUGE (I.). Beiträge zur Biologie der Mikrofilaria immitis. [**The Biology of Microfilaria immitis.**]—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. pp. 405–409.

The microfilariae of *Dirofilaria immitis* of the dog shows a daily periodicity. The minimum is between 6 and 10 a.m. and the maximum is in the evening. The periodicity is not, however, so sharply marked as that of *Microfilaria loa diurna.*

The microfilariae are more numerous in the venous than in the arterial system. The worms are, however, not limited to the blood vascular system, as they are to be found in lymph spaces both in the skin and in lymphatic glands.

No confirmation could be obtained of the view that the parasite is transmitted by the dog flea.

OGUNI (Hideo). **On the "Wahi" or "Kose" Disease, an Elephantiasis-like Disease in Cattle. First Report.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 188–190.

The disease occurs in animals from 3 to 7 years old, and is of far more frequent occurrence during the summer than the winter. It has been considered as a form of scabies, but the author has demonstrated a microfilaria which he considers to be causally connected with the disease.

The lesions generally involve the head, neck and back, and the earliest stage is the development of a number of small nodules on the skin. In some of these the surface is shed leaving a bright red moist spot. Gradually the number of nodules increases, the hair falls out, and the skin is thrown into thick folds.

There is constant irritation of the skin.

Microscopic examination of the skin shows that in the early stages there is extensive cellular infiltration in the corium. The majority of the cells are eosinophile leucocytes. Microfilariae are discoverable in these infiltrations and in the blood vessels.

In the second stage, when the surface epithelium has been rubbed off, granulation takes place and the eosinophilia is less pronounced. At this stage microfilariae are very scantily present.

The microfilaria is like the embryo of *Filaria immitis* but smaller. It is about 130μ in length. No sheath has been demonstrated. The anterior end is blunt and the posterior pointed.

Staining with alum haematoxylin reveals the presence of nuclei, the nerve ring, excretory pores, genital cells and anal pore.

FIELDING (J. W.). **Preliminary Note on the Transmission of the Eye Worm of Australian Poultry.**—*Australian Jl. Exp. Biol & Med. Sci.* 1926. Vol. 3. pp. 225–232. [From a Reprint.]

After discussing briefly the views held regarding the identity of the parasite, the author gives an account of his own experiments and observations.

He states that "worms have been recovered alive in the mouth, oesophagus, and crop; and the eggs in the mouth, oesophagus, crop,

along the alimentary tract, and in the droppings." These eggs hatched after varying periods from 24 hours upwards, and the adults have been kept alive in various solutions for a number of days under laboratory conditions. The blood has been examined for larvae with negative result. The " eye-fluid " was also examined without result.

The pus-like material which is found in the eyes of infected birds was found to comprise two kinds of matter, " a hard mass of old-standing material, and, secondly, a softer fresher material, both of which, in our opinion, are the result of the decomposition of the worms themselves." In the softer pus eggs were frequently found.

The ground in the infected yards, particularly in the shady parts, was riddled with filariform larvae. Examination of chickens and ducks showed the presence of the eye worms in the former at 10 days of age and in the latter from 14 to 21 days.

A search for an intermediate host appears to have shown that the cockroach, *Leucophaea surinamensis*, Linn., was responsible. Experiments in this connexion indicated that the cockroach ingests the larvae. These pass through the wall of the alimentary tract, and become encapsuled on its outer surface. Here changes occur and the worm reaches the infective stage, after which they leave the capsules and gain the body cavities. They have been recovered from the thoracic and abdominal cavities and from the legs. The infected cockroaches are eaten by poultry and the worms escape, it is believed, in the crop, pass up the oesophagus and gain the naso-lachrymal duct.

Points still requiring elucidation are the length of time required for the larvae to reach the infective stage, and the interval elapsing between the infestation of the birds and the commencement of egg-laying.

Trapping the cockroaches is the principal line of attack on the problem of control.

Treatment should include thorough cleaning and disinfection of the yards, the direct treatment of the birds by dropping a little turpentine into the eyes and washing it out after half an hour with warm water or boracic solution. Kerosene is said to give good results.

SCHULZ (R. E.). **On the Genus *Aspiculuris* Schulz, 1924, and Two New Species of it—*A. dinniki* and *A. asiatica*, from Rodents.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 267–275. With 7 text figs.

The author gives an emended description of the diagnosis of the genus Aspiculuris and describes and figures two new species. Both occur in the caecum and large intestine of rodents.

PETROW (A. M.). *Spirocerca arctica*—**a New Nematode Parasite of *Canis familiaris* and *Vulpes lagopus* in North Russia.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 261–266. With 3 text figs.

The worms described were obtained from tumours in the stomach of the hosts. The tumours projected from the serous membrane and were as large as peas.

THWAITE (J. W.). **On a Collection of Nematodes from Ceylon.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 225–244. With 7 text figs.

This paper deals with the nematodes found in a collection of helminths sent by the Director of the Colombo Museum, and refers mainly to specimens from fishes.

Physaloptera musculi n.sp. was found in the intestine of a domestic mouse. This parasite is the only new species from mammals which is figured and described.

SPREHN (C.). Echinostomiden bei Tauben. [**Echinostomidae in Pigeons.**]—*Deut. Tierarzt. Woch.* 1927. July 9. Vol. 35. No. 28. pp. 451–455. With 3 text figs.

WERESCHTSCHAGIN (M. N.). Uber die Oxyuris des Schafes und der Ziege. [**The Oxyuris of the Sheep and Goat.**]—*Deut. Tierärzt. Woch.* 1927. July 9. Vol. 35. No. 28. pp. 455–456. With 1 text fig.

BACTERIAL DISEASES.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. 1927. Aug. Vol. 49. No. 2. pp. 107–115. **The Relation of Mediterranean Fever to Contagious Abortion in Cattle.** [Editorial.]

This editorial contains a summary of the available information regarding the identity or otherwise of the organisms causing contagious abortion in cattle and undulant fever in man.

It is concluded that there is a fairly close relationship between the two organisms, but that the degree and nature of that relationship has not been determined.

The divergent results obtained suggest that there are variables which have not been taken into account.

"In view of the recent observations on the several antigenic components apparently to be found in varying quantities in different cultures from the same original stock and associated with properties of heat stability or lability, types of flocculation and characters of colonies, it seems possible that a study of variants of either or both of these organisms might enable previous work to be coordinated and discrepancies to be explained."

i. BIRCH (R. R.) & GILMAN (H. L.). **The Agglutination Test as an Aid in handling Bang Abortion Disease.**—*Rept. New York State Vet. Colleg.* 1925–1926. Legislative Document No. 28. 1927. pp. 81–85. J. B. Lyon Company. Printers. Albany.

ii. ——, ——. **Bang Abortion Disease in Cattle.**—*Idem.* pp. 86–102.

i. This paper is a summary of the general features of contagious bovine abortion and the application of the test in the control of the disease. It contains nothing new.

ii. This paper is a reprint, and contains much the same information as the foregoing, but in a rather more extended form.

HAGAN (W. A.). **The Value of Placental Examination for the Diagnosis of Infectious Abortion of Cattle.**—*Ann. Rept. New York State Vet. College.* 1925–26. Legislative Document. No. 28. 1927. pp. 125–130.

The author describes the changes occurring in the chorion in cases of contagious abortion, and points out that these are the only gross lesions which can be recognized definitely with the naked eye. In the infected chorion the part most markedly affected is the intercotyledonous membrane and not the cotyledons.

A good deal depends upon getting the cleansings in a fresh state, but even in putrid specimens the leathery condition of the membrane is said to be recognizable. It must be remembered that the area involved may be small or large.

CARPENTER (C. M.). **Agglutinins for** *Brucella abortus* **in the Blood Serum of Man.**—*Ann. Rept. New York State Vet. Coll.* 1925–26. Legislative document. No. 28. 1927. pp. 178–181.

The author examined twenty cases of illness in man which resembled undulant fever. An organism identified as *B. abortus* was isolated from the blood of five of these. But in two of the five agglutinins for *B. abortus* could not be detected. One of these gave a positive Widal and the other a Wassermann. The titres of the sera varied from 1 : 30 to 1 : 480.

It thus appears that the agglutination test cannot be relied upon to detect the presence of *B. abortus* infection in man.

LERCHE. Beitrag zum Spirillenabortus beim Rinde. [**Abortion caused by Spirillum in Cattle.**]—*Deut. Tierärzt. Woch.* 1927. July. 23. Vol. 35. No. 30. pp. 484–487.

Examination of various materials from 1,565 cases of abortion revealed the presence of the spirillum in 22 of them. Bang's bacillus was found 886 times. On the majority of farms where infection with spirillum was detected only a few cows aborted. In two cases only did the losses amount to 10 and 24·3 per cent.

There is evidence to show that the spirillum may occur alone or in conjunction with Bang's bacillus.

Abortion can be induced in guineapigs by inoculation with cultures of the spirillum, but rabbits and mice are less susceptible. In a single experiment with a cow the result was negative.

HENDRICKSON (J. M.). **The Differentiation of** *Bact. pullorum* **(Rettger) and** *Bact. sanguinarium* **(Moore).**—*Ann. Rept. New York State Vet. Coll.* 1925–26. Legislative Document No. 28. 1927. pp. 146–172.

The author deals at considerable length with the tests carried out with the two organisms. These tests were cultural and serological. Tabular statements are given showing the results obtained. In the fermentation tests it appears that the nature of the nutrient medium is of importance. In serum water the same carbohydrates were attacked by all strains of the organisms used, but *B. pullorum* A

produced gas in all, and *B. pullorum* B differed from *B. sanguinarium* only in that dextrin and dulcite were fermented more rapidly by the latter than by the former.

In meat infusion or meat extract media maltose, dextrin, and dulcite were readily fermented by *B. sanguinarium* but not, or hardly at all, by *B. pullorum*. The two types of *B. pullorum* (A & B) fermented the same sugars, but gas production was erratic.

The strains were mutually agglutinable, and the agglutinins were absorbed practically completely by homologous and heterologous strains.

PONS (R.) & ADVIER (M.). **Melioidosis in Cochin China.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 28–30. With 1 chart in text.

The authors place on record the occurrence of a case of melioidosis in a human being in Saigon. The organism was isolated from the patient's blood.

There was no evidence of the disease having been contracted from a human source, but the patient had been in contact with domesticated animals and rats and shrews were present in the dwelling. There had, however, been no deaths among the animals.

STANTON (A. T.) & FLETCHER (W.). **Melioidosis. Notes on a Culture of *B. whitmori* from Saigon.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 31–32.

An account is given of the strain isolated by PONS and ADVIER in Saigon. Plated on eosin-methylene blue agar two types of colonies developed, one of which was far more corrugated and wrinkled than the other. Both grew in broth and the latter type of colony yielded organisms which were far more motile than the former. On glycerin agar the corrugation appeared earlier with the more wrinkled type than with the ordinary type. Both fermented lactose, saccharose, glucose, mannite, dulcite, maltose and dextrin with the production of acid but no gas. Cultures from the ordinary type of colony were agglutinated to full titre by sera prepared from the Kuala Lumpur strains, while the more corrugated type was agglutinated to about one-third this extent.

The more rugose type appeared to be more virulent than the other. The former caused a septicaemic condition with death in a week. The latter caused death in three weeks and in addition to the area of necrosis at the site of inoculation, which was present in both animals, there was caseation of glands, and the formation of caseous nodules in the spleen.

STANTON (A. T.), FLETCHER (W.), & SYMONDS (S. L.). **Melioidosis in a Horse.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 33–35.

B. whitmori appears to be closely related to certain strains of glanders bacilli isolated in India and Java, but its relationship to strains of *B. mallei* in the National Collection is very remote.

The disease occurs naturally in man, rats, cats, dogs, guineapigs and rabbits, but it has not hitherto been recognized in horses.

Previous experiments indicated that horses were immune to melioidosis, but this appears to be incorrect.

From some thick, blood-streaked pus coughed up by a horse *B. whitmori* was isolated by guineapig inoculation. This isolation was repeated a week later from pus which was found dripping from the horse's nostril. Serum from the horse in question agglutinated the type strain of *B. whitmori* to 1 in 8,000. The sera of seven other horses in the same stable did not agglutinate it beyond 1 in 200. The horse did not lose condition or appear to be ill. It was given a course of treatment with arsenic and was actually run in a race. The discharge of pus from the nose was intermittent, and in the intervals *B. whitmori* could not be cultivated from material obtained from the nasal cavity.

Eventually the animal was killed, but no active lesions were discovered. Cultures from the blood, various glands and organs were negative, but the blood still agglutinated in high dilution.

The organism, which was isolated on a number of occasions, was agglutinated at 1 in 15,000 by serum prepared with the type strain (Ragaviah). The strain produced suppurating buboes in guineapigs and rats and death in less than a fortnight. The introduction of culture into the nostril of a guineapig caused death on the 25th day.

AGLIANY (M.). Deux Cas consécutifs de tétanos grave, guéris par la promenade forcée, sans aucun traitement medical. [**Two Consecutive Cases of Severe Tetanus treated by Forced Exercise alone.**] —*Rev. Vét.* 1927. Aug. Vol. 79. pp. 44–444.

The idea of trying the effect of exercise arose from watching two animals affected with tetanus attempting to eat. It was observed that as the animals persisted in their efforts the lips, jaws, and tongue became very gradually more mobile.

Two periods of exercise were given daily, each lasting about twenty minutes with frequent rests. On each occasion there was an appreciable improvement at the end of the period of exercise .

In both cases recovery was complete in about a month. No medicinal or serum treatment of any kind was given.

ZOELLER (C.). De la stabilité de l'immunité antitétanique réalisée par l'anatoxine. [**The Stability of the Immunity produced by Tetanus Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 879–882.

The duration of immunity in man to tetanus produced by the injection of anatoxin cannot be established by direct experiment, but some information will be obtained from the results of wounds in immunized soldiers.

The author has carried out experiments with guineapigs immunized with anatoxin and subjected to various adverse circumstances such as cold, heat, fatigue and injury. They were inoculated with cultures of tetanus bacilli and of other organisms. These experiments show that the resistance is maintained in all cases, and that the immunity is not only one against toxin, but also against infection.

BESREDKA (A.) & NAKAGAWA (S.). Immunisation passive contre le tétanos par la voie cutanée. [**Immunization against Tetanus by the Skin Path.**]—*Ann. Inst. Pasteur.* 1927. June. Vol. 41. No. 6. pp. 607–614.

In 1903 CALMETTE showed that powdering wounds infected with tetanus spores with dried antitetanic serum prevented the development of tetanus in guineapigs so treated. In the present paper the authors describe experiments designed to show that tetanus antitoxin can be absorbed by skin which has merely been shaved, and that under certain circumstances it can be absorbed by skin in which there is no wound and reach the circulation. The application of antitetanic serum to the skin as a dressing, particularly if it is in the form of a cream, is absolutely without danger. Whatever the hypersensibility of the animal the absorption of the serum is so slow that symptoms of anaphylaxis never make their appearance.

Antitetanic serum applied to the shaved abdomen of guineapigs 24 hours before an injection of toxin prevents the development of symptoms.

If the application be made from 1 to 3 hours after the toxin has been used a fatal result is prevented, but in some cases slight symptoms of tetanus are noted.

If the serum be applied as a liquid dressing its action is local, but if applied as a cream it is protective if the toxin be injected elsewhere. The cream or pomade is made by mixing two parts of anti-tetanic serum with one part of anhydrous lanoline.

RAMON (G.) & DESCOMBEY (P.). L'anatoxine tétanique et la prophylaxie du tétanos chez le cheval et les animaux domestiques. [**Tetanic Anatoxin, and the Prophylaxis of Tetanus in the Horse and Domesticated Animals.**]—*Rec. Méd. Vét.* 1927. May 30. Vol. 103. No. 10. pp. 191–204 ; and *Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 834–847.

In an introductory portion of the paper the authors point out that in certain places the risk of infection with tetanus is ever present, and that there are plenty of cases in which the portal of entry is not discoverable. It is impracticable to repeat injections of serum fortnightly, and there is therefore need of some method whereby a lasting immunity against tetanus can be conferred. Tetanic anatoxin furnishes the means of establishing this.

Before carrying out any experiments with anatoxin tests were made for the purpose of ascertaining whether there was present in the serum of the animals used any tetanus antitoxin. It is well known that both horses and men frequently yield sera that are definitely antagonistic to diphtheria toxin, but in no case have the authors found tetanus antitoxin in the serum of more than a hundred horses, in spite of the fact that two of the animals had recovered from attacks of tetanus.

From their experiments the authors gather that a single injection of anatoxin, of practically no matter what quantity, produces only a slight degree of immunity, but it enables the animal to respond more pronouncedly to a second injection.

They also found that the immunity following the second dose is stronger in direct proportion to the interval elapsing between the two doses. The interval should not be less than three weeks, and should, preferably, be a month.

The addition of tapioca powder to the anatoxin injected increases enormously the amount of antibody developed.

Slightly inferior results have followed the injection of an oily emulsion of anatoxin.

It has been found that the addition of a culture of streptococci killed by heat to the anatoxin also increases its value for the production of immune serum. The addition of atoxyl, tryparsamide and other drugs also increases the degree of immunity established by the injection of anatoxin, but not to the same extent as tapioca. The duration of the immunity has been ascertained by withdrawing blood at intervals and testing the serum against toxin. It is found that while serum drawn after two injections of anatoxin alone will neutralize in doses of 1 cc. 10 lethal doses of toxin (for the guineapig), at the end of a year it will still neutralize 3 lethal doses, and after eighteen months 1 lethal dose. The addition of tapioca to the anatoxin sends up the titre of the antiserum produced to 200 to 600 lethal doses. After years the serum is still effective for the neutralization of 40 to 80. Sufficient time has not yet elapsed since the experiments were carried out to see what is the actual duration of useful immunity.

The repetition of an injection of anatoxin and tapioca two years after the original doses have been given increases the titre of the serum enormously.

The simultaneous injection of anatoxin and anti-tetanic serum at different parts of the body reduces the immunity response to the former, but the use of antitetanic serum after the primary injection of anatoxin does not influence the course of the immunization.

NATTAN-LARRIER (L.), RAMON (G.) & GRASSET (E.). L'anatoxine tétanique et l'immunité antitétanique chez la mère et le noveau-né. [**Tetanus Anatoxin and Antitetanic Immunity in the Mother and the Newly-Born.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 848–861.

Experiments carried out with rabbits showed that the young of does immunized with anatoxin had tetanus antitoxin in their blood to practically the same extent as in the does.

It was further found that the immunity was of the passive type, but that it persists for about 2 months after birth. Young rabbits are, however, capable of reacting to the inoculation of or to ingestion of anatoxin by producing antitoxin. The amount of antitoxin is greater following subcutaneous injection than that resulting from the ingestion of anatoxin.

NATTAN-LARRIER (L.), RAMON (G.) & GRASSET (E.). Contribution à l'étude du passage des antigènes et des anticorps à travers le placenta. [**The Passage of Antigens and Antibodies through the Placenta.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 862–867.

The injection of anatoxin intravenously into rabbits forty-eight hours prior to parturition does not result in the presence of antitoxin in the serum of the young, and they possess no immunity.

The intravenous injection of tetanus toxin on the day of expected parturition does not lead to the passage of the toxin to the foetuses. If these are removed about 8 hours after the injection by caesarian section, bled out, and their blood used for the inoculation of guineapigs the latter show no symptoms. If some of the young are kept alive and put to a foster-mother they do not develop any symptoms of tetanus.

When large doses of tetanus toxin are injected intracardially into pregnant guineapigs a small amount appears to pass into the foetuses.

It was found, however, that anatoxin is capable of passing through the placenta.

RAMON (G.) & GRASSET (E.). Recherches sur le passage des toxines, des anatoxines, et des antitoxines à travers les parois du tube digestif. De l'immunité antitoxique active et passive par voie digestive chez l'animal d'expériences. [**The Passage of Toxins, Anatoxins, and Antitoxins through the Walls of the Alimentary Tract.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 868–878.

Experiments showed that the alimentary canal of young animals is pervious to toxins and anatoxins, but the immunity resulting from the ingestion of the latter is weaker than that produced by subcutaneous injection.

In adult animals the absorption of a small quantity of bile or castor oil prior to the ingestion of the anatoxin leads to the production of results parallel to those obtained in young animals, but without the preliminary treatment negative results are obtained.

Passive immunity can be established by way of the alimentary canal if bile be given beforehand to render absorption more readily achieved, or simple dilution of the antiserum will achieve the same result.

The resulting passive immunity is of a much lower standard than that achieved by the subcutaneous injection of the antiserum.

The immunity so conferred is humoral or general and not local.

OTTEN (L.). Zur Differential-Diagnose zwischen den Erregern der Haemorrhagischen Septikaemien. [**The Differential Diagnosis of the Causal Organisms of Haemorrhagic Septicaemia.**]—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. p. 1103.

This note is a résumé only. It is stated that a medium composed of 0·5 per cent. peptone water, with glucose in decreasing amounts and litmus as an indicator, yields clearly marked differences in colour reactions with the plague bacillus, bac. pseudotuberculosis rodentium, and bac. plurisepticus. No details are given.

VELU (H.). Vaccination contre le charbon bactéridien par inoculation intradermique en un temps. [**The Single Intradermal Vaccination against Anthrax.**]—*Ann. Inst. Pasteur.* 1927. June. Vol. 41. No. 6. pp. 615–647.

The author first draws attention to the difficulties of handling the semi-wild poor sheep of Northern Africa. Their value is such that the arrangement of proper buildings, etc., for handling the sheep, and the cost of going over the flocks more than once would be prohibitive.

They therefore determined to try intradermal inoculation in a single dose. They have already found that attempts to vaccinate by applying the vaccine to sound or to scarified skin are not successful.

A preliminary experiment showed that it was possible to confer a solid immunity on Moroccan sheep by a single intradermal injection of vaccine. The vaccine used was prepared from strains given by THEILER.

The injections were made into the anal folds because of the ease of the operation. Should the vaccine go through the skin serious results are not obtained as they would be if the injection were made behind the shoulder.

In pigs the dorsal surface of the ear was selected, and in horses, after a number of trials of other sites, the side of the neck. In the case of the latter animal there is a greater chance of the dose going into the subcutaneous tissue, but there will be no ill effect save a more or less pronounced local reaction, and a certain amount of delay in the development of the immunity. In sheep this method of vaccination establishes immunity within a very short time, and it can be practised even on sheep that are in the period of incubation. Experiments with horses showed a solid immunity is established in five days or less, and animals need not be taken off work while the vaccination is being carried out.

During the period 1924–1926 more than half-a-million animals were vaccinated in various French possessions, and it has been found possible to vaccinate without accident, even when there is an actual outbreak. In fact, by vaccinating while outbreaks are in progress these can be stopped within 48 hours.

One-fifth of the dose required for subcutaneous immunization is required by the intradermal method for the actual establishment of immunity, but since five times this dose are used the immunity must be very strong. As a general rule the immunity lasts for about 9 months, but in some cases for a year.

JANUSCHKE (E.). Ueber die Leistungsfähigkeit der Ascolireaktion bei der Milzbranddiagnose. [**The Applicability of the Ascoli Reaction to the Diagnosis of Anthrax.**]—*Seuchenbekämpfung.* 1927. Vol. 4. No. 1. pp. 58–61. [To be continued.]

In this short paper the author gives some account of the experiments of others regarding the limits of applicability of the Ascoli reaction to the diagnosis of anthrax.

The questions requiring an answer are as follow: What is the relationship between the number of bacilli present and the quantitative demonstrability of the precipitinogen? What is the minimal amount of precipitinogen which a precipitating anthrax serum will render recognizable? How and in what amount is the precipitinogen obtained from the organs and blood by the " thermo-extraction " ?

ROTTGARDT (A.). Zur Rauschbranddiagnose. [**The Diagnosis of Blackquarter.**]—*Berlin. Tierärzt. Woch.* 1927. July 8. Vol. 43. No. 27. pp. 441–444.

The author points out the difficulties associated with the detection of the bacillus of blackquarter in materials that are not fresh as a result of the simultaneous presence of the vibrion septique, and describes a technique for the removal of these difficulties.

By mixing an antiserum prepared by immunizing sheep with a number of different strains of the vibrio with the material for diagnosis and incubating at 37° C. for periods ranging up to 2 hours he finds that the vibrio can be killed out, leaving the bacillus of blackquarter. This is then recovered by guineapig inoculation.

NELSON (J. B.) & SMITH (Theobald). **Studies on a Paratyphoid Infection in Guinea Pigs. I. Report of a Natural Outbreak of Para-typhoid in a Guinea Pig Population.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 353–363.

The outbreak occurred in a stock of guineapigs which had had no new animals introduced within a period of 5 years. The disease appears to have been that described by EBERTH in 1885 as pseudo-tuberculosis of the guineapig. The epidemic continued for about 8 weeks, and this was followed by an endemic phase which has continued.

The principal lesions were yellowish nodules of various sizes studded over the spleen. Similar lesions were sometimes found in the liver, which was in a condition of fatty degeneration. The gall bladder sometimes contained thin purulent fluid. There was congestion of the alimentary tract. The epidemic began abruptly, and throughout females were rather more frequently attacked than males. In adult animals the disease was not particularly acute, the lesions indicating that infection had been in existence for a week or two before death occurred. Unweaned animals sometimes died 2 or 3 days after birth without showing lesions, but the organism was recovered. The exact position of the organism in the Salmonella group was not decided, but it was closely allied to paratyphoid organisms derived from other rodents. It showed only a remote relationship to human paratyphoid B. and bacillus enteriditis.

SMITH (Theobald) & NELSON (J. B.). **Studies on a Paratyphoid Infection in Guinea Pigs. II. Factors involved in the Transition from Epidemic to Endemic Phase.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 365–377.

The authors consider various hypotheses which may explain the decline of the acute epidemic to the endemic stage. The hypotheses suggested and criticized are (*a*) that the outbreak was an attack upon a number of animals below the normal resisting power of the species which had accumulated during a period of years when there had been freedom from disease. This accumulation may have been due to fortuitous sexual selection or to spontaneous variations in resistance. Most of the susceptible individuals were wiped out during the epidemic phase, and the absence of recurrence of epidemic outbreaks supports this view; (*b*) an increase in specific immunity. This view is not well supported because a gradual decrease in mortality would have been expected and because a larger number of carriers would have been expected during the endemic phase; (*c*) a decline of virulence of the organism. Comparative tests with cultures isolated at different periods failed to give evidence that this had occurred.

SMITH (Theobald) & ORCUTT (Marion L.). **Vibrios from Calves and their Serological Relation to** *Vibrio fetus.*—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 391–397.

The authors describe tests carried out with vibrios isolated from the organs of calves of various ages after death. Agglutination tests were applied in various ways and the evidence obtained indicated that one of four was distinct from the *Vibrio foetus*, and the others were closely allied to but not identical with that organism.

NUTT (Muriel M.). **The Method of Division of the Rough and Smooth Type of Colonies among Bacilli of the Salmonella Group.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 44–48. With 8 text figs.

By a special technique the author has been able to watch the process of growth from single organisms isolated from rough and smooth colonies of organisms of the Salmonella type. The observations were made by dark ground illumination at intervals.

The results obtained are described and figured. In the multiplication of organisms from rough colonies the chain of bacilli is bent in a zig-zag fashion, while in the formation of smooth colonies the daughter organisms tend to become detached from each other and to slide up alongside, thus forming a more or less regular pattern.

THEILER (A.). **Lamsiekte (Parabotulism) in Cattle in South Africa.**—*Union of South Africa. 11th & 12th Reports, Director of Veterinary Education and Research.* Part II. 1927. January. pp. 821–1361.

This report is a record of the experimental work upon lamsiekte carried out since 1917, and VILJOEN, GREEN, DU TOIT, MEIER, and ROBINSON have collaborated with Theiler in its prosecution.

Lamsiekte is the name originally given to a disease of cattle characterised by paralysis and paresis, principally of the locomotor system, but sometimes also of the muscles of mastication and deglutition.

Naturally the disease affects cattle almost exclusively, but the symptoms can be produced in other species experimentally. Horses are less susceptible than ruminants, and poultry still less so. Dogs and pigs are practically immune.

A survey is given of the views that have been held at various times as to the nature of the condition, of which the most important was the " deficiency of lime " theory.

In 1919 Theiler saw a case of lamsiekte following the deliberate ingestion by cattle of the skeletal débris of a carcase, and found that material from the same carcase was capable of producing the disease experimentally. This led to the conception of a toxin-producing saprophyte being the cause of the disease.

The sequence of events which leads up to the production of the disease is then as follows. Phosphorus deficiency in the soil leads to a similar deficiency in the pasture and in the animal. As one of the manifestations of the last of these cattle develop a craving for the ingestion of bones. Ordinarily the ingestion of bones causes no harm, but should these bones be infected with the Bacillus parabotulinus, which produces a very powerful toxin, then the symptoms

of the disease are developed. As expressed in this paper a number of factors are linked in the production of this disease, and the whole sequence of events terminating in lamsiekte can be broken by breaking one link.

Phosphorus deficiency in the soil leads to cattle acquiring the habit of eating bones. Bones are supplied by carcase débris, but these are harmless unless they are contaminated with the toxin producing saprophytic organism. The symptoms of lamsiekte are produced by the ingestion of such contaminated bones, the toxin elaborated by the bacillus in the bones acting on the nervous system of animals susceptible to it.

The habit of eating bones can be broken by using phosphatic manures, or by feeding bone meal or some phosphorus-rich supplement. The intoxication can be prevented by clearing away carcase débris.

OGURA (K.). Ueber eine Modificaktion der Giesselfärbung und die Giesselform der Bakterien. [**A Modification of the Staining and Form of Flagella of Bacteria.**]—*Jl. Jap. Vet. Soc.* 1927. June. Vol. 6. No. 2. pp. 162–165.

A suspension of a 24–hour culture (presumably from a solid medium) is made in distilled water. This should be just opalescent. To this are added a few drops of 2 per cent. " Osmium " solution. A loopful of the mixture is spread on a clean cover-glass and allowed to dry slowly in the incubator. Fixation is effected by slight heating over the flame. The specimen is then covered with a Loeffler's mordant, which has the following composition :—

20 per cent. tannic acid, 10 cc.

Saturated iron sulphate solution, 5 cc.

Saturated alcoholic fuchsin, 1 cc.

This must be freshly prepared for use as it becomes ineffective within a few days. The coverglass is quickly warmed until the mordant boils, and then thoroughly washed under a fairly strong stream of water. The dried mordant is carefully wiped from the edges of the coverglass and the specimen is treated for a few seconds with hydrochloric acid alcohol, and again washed.

The specimen is stained with dilute fuchsin and then covered with 1 to 3 per cent. ammoniacal silver nitrate solution and quickly warmed to boiling.

To make preparations more permanent they should be immersed for 20 seconds in fixing solution (presumably hyposulphite of soda), washed, and dried.

Using this method the author has been able to find two types of flagella in some organisms, a fine and coarse spiral. Of B. paratyphoid B. 28 strains showed coarse spiral and six fine spiral flagella. Twenty-five strains of *B. abortus equi* had coarse and 6 fine spiral flagella. In the case of *B. suipestifer* the relationship of the types was 5 to 1. Occasionally both forms of flagella may be found in a single organism.

VAN HEELSBERGER (T.). Een Geval van echte " Gasbrand " (*Bac. phlegmonis emphysematosae* E. Fränkel) bij bet Paard. [**A True Case of Gas Gangrene (*Bac. phlegmonis emphysematosae*) in a Horse.**]—*Tijdschr. v. Diergeneesk.* 1926. Feb. 15. Vol. 53. No. 4. pp. 156–159.

MYCOTIC DISEASES.

THEILER (A.). Die Diplodioses der Rinder und Schafe in Süd-Afrika. [**Diplodiosis of the Ox and Sheep in South Africa.**]—*Deut. Tierärzt. Woch.* 1927. June 18. Vol. 35. No. 25. pp. 395–399. With 4 text figs.

Diplodiosis is the name used for the disease which results from the eating of maize infected with the mould *Diplodia zeae.*

Although maize was for some years suspected of being in some way connected with the causation of the disease, definite proof of the causal connection was furnished by MITCHELL working in Natal.

At first only cattle were thought to be affected, but subsequently the same condition was observed in sheep.

The disease does not make its appearance every year, but its incidence is connected with rainfall. Outbreaks are favoured by wet seasons.

It occurs during the winter months of June to August when maize feeding has to be resorted to.

The maize crops are dealt with as follows. The cobs are picked and the stalks and leaves are left standing to serve as feed later. Diseased cobs are either left on the stems or thrown away. Cattle and sheep often show a preference for them.

The causal mould invades the whole of the cob, and the author gives an account of its morphological characters. It can be cultivated artificially on sterilized maize where it forms at first a white woolly layer which subsequently becomes black. Under natural conditions the disease is seen in cattle and sheep only, and experimentally it has not been found possible to produce it in horses or pigs.

Considerable quantities of infected cobs or of artificial cultures are required to produce symptoms in experimental animals, but the amount required appears to vary from animal to animal. In experimental cases smaller quantities given for shorter periods have sometimes produced the condition when larger amounts have not.

The most pronounced symptom is ataxy and all stages of uncertainty of gait are observed. Loss of control is generally most pronounced in the hind quarters. The fore-legs are sometimes moved with a high stepping action. In more advanced cases animals are unable to rise. Lachrymation and salivation are commonly observed. Muscular tremors occur. The appetite is not lost and rumination continues. Defaecation is normal, and the faeces are not fluid. In severe cases there may be constipation and a considerable amount of mucus is passed. When the infected food is stopped recovery takes place within a day or two. There is no fever at any stage of the disease. Little is known regarding the pathology of the condition.

LEWIS (P. A.). **A Filterable Yeast-like Microorganism** (*Schizosaccharomyces filtrans*, **n. sp.**)—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 277–290. With 1 plate.

The organism described was probably a saprophyte and an accidental contaminant arising in a series of cultures primarily directed towards the study of the filterable virus of hog cholera.

The organism appeared to be pleomorphic in that certain forms were visible under the microscope while others were not recognizable.

Cultures visible to the eye were obtained in solid and in liquid media. Under certain conditions forms capable of regenerating the complete culture were filterable through a Berkefeld N filter.

The essential point is that in dealing with filterable viruses growths obtained in culture media which are visible to the naked eye should not be disregarded on this score alone.

DISEASES DUE TO FILTERABLE VIRUSES.

SCHERN (K.). Postinfektionelle Immunisierungsversuche sowie Immunisierungsversuche in Verdachtsfällen gegen Tollwut unter den Bedingungen der Praxis. [**Post-Infectional Immunization and Immunization in Suspected Cases of Rabies under the Conditions of Practice.**]—*Berlin. Tierärzt. Woch.* 1927. May 6. Vol. 43. No. 18. pp. 298–300.

The author gives tabular statements of dogs and other animals inoculated after they had been bitten by rabid dogs.

The first table shows 18 dogs which were inoculated with protective vaccine derived from rabbits within 2 to 8 days after having been bitten. The inoculations were made from 11 months to a year and five months prior to the date of writing. None of the dogs had developed rabies. There are no controls, but it is said that some of the dogs bitten by the same rabid dogs died of rabies or were destroyed. In a second table details are given of 12 dogs treated, but in these cases there was no certainty that the dogs biting them were rabid or not. None of them developed rabies.

The third table contains details regarding the protective inoculation of seven cows, a mare, a calf, and a sheep, all of which had been bitten by rabid dogs. One of the cows died suddenly from an undetermined reason, and one died of rabies.

SCHNÜRER (J.) & DAVID (H.). Kutane Immunisierung von Hunden gegen Lyssa. [**The Cutaneous Immunization of Dogs against Rabies.**]—*Berlin. Tierärzt. Woch.* 1927. Apr. 29. Vol. 43. No. 17. pp. 274.

The authors have used two materials as vaccine, namely Vienna fixed virus and a carbolized virus prepared in the manner described by UMENO and DOI.

The process of vaccination was carried out as follows. The hair on the left side of the neck was removed by means of a depilatory and 12 to 14 scratches were then made on the skin. The scratches were made just deep enough to bring traces of blood at places. The vaccine was applied with a brush and rubbed in carefully. A light bandage was then placed over the vaccinated area to prevent the dogs licking each other.

One series of 6 dogs was treated in this way with Vienna fixed virus No. 200, and a second series of two dogs was done with the carbolized virus. Control rabbits inoculated intracranially remained healthy.

Two of the first series of dogs died of enteritis. Their brains were found free from virus by inoculation.

After three months' interval all the surviving dogs and six normal controls were inoculated with street virus. Three of the controls

died of rabies, one died of distemper, but was proved to be free from the virus, and two remained perfectly healthy. All the vaccinated dogs survived without showing any symptoms.

BAILLY (J.). Pratique de la vaccination antirabique des solipèdes par le virus-éther (Methode de Remlinger). [**Procedure for Anti-Rabies Vaccination of Solipeds by Remlinger's Virus-Ether Method.**] —*Rev. Gén. Méd. Vét.* 1927. May. Vol. 36. No. 425. pp. 254–258.

The author reports the results of vaccinating 4 horses and 2 mules by REMLINGER'S method. He states that altogether 60 animals have been treated, but the bulk of them would appear to have been ruminants.

Three vaccines are used and they are prepared by macerating the brains of rabbits killed with fixed virus in sulphuric ether for 25, 20, and 15 hours respectively.

He gives an account of the symptoms presented by a pony affected with furious rabies. As the clinical picture was so clear the animal was destroyed, but rabbit inoculations were not carried out. During crisis this pony had bitten a number of people, some dogs, two horses and two mules. These mules and horses were vaccinated together with two other horses bitten by a dog which died suddenly after exhibiting the typical symptoms of furious rabies. In the case of 4 of the animals treatment was begun on the day following the bites, and in the other two at 3 and 7 days interval. None of the animals developed rabies during periods of observation ranging from 5 to 9 months.

The average dose given was 8 grammes of brain substance at each injection. There was no general disturbance of health following the injections, but equines, and apparently equines only, may develop at the site of inoculation large oedematous swellings. These, however, disappear quickly and cause no harm.

The vaccines are prepared as follows. The fresh or preserved rabbit brains are placed in sulphuric ether for 25, 20, or 15 hours, depending upon the vaccine it is desired to produce. It is then emulsified in 40 cc. of salt solution. This is quite readily achieved, because brains which have been soaked in ether are friable and readily miscible with water. The emulsion is strained through muslin and injected immediately. All manipulations must, of course, be carried out with due precautions, and all apparatus must be sterile.

The vaccine can be prepared for use away from the laboratory by replacing the salt solution by either 50 per cent. glycerin or by salt solution formolized to 1 in 1,800. In these media the vaccine remains good for a week at summer temperature.

CRAWFORD (M.). **Four Cases of Equine Rabies with Failure to protect with Anti-Rabic Vaccine.**— *Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 140–144.

Five horses, a cow, and a dog were bitten by a rabid dog. It was decided to vaccinate some of the horses. Both the rabid dog and the dog bitten were destroyed. Three horses each received daily 10cc. of a 5 per cent. emulsion of brain of rabbits dying as the result of inoculation with fixed virus.

Two of these developed symptoms after 28 and 35 days interval respectively. Two which were not vaccinated developed symptoms after 45 and 48 days. The remaining horse which was vaccinated is alive and well. The cow was not vaccinated, and did not develop symptoms.

The symptoms presented by the first animal to develop them, and which the writer did not see, appear to have differed from those presented by later cases. Restlessness, a startled appearance, and subsequent paralysis of the hindquarters were seen.

The other cases showed evidence of great excitement. One animal seized the bars of the door with its teeth and shook them violently. If approached it fell to the ground, and when down rolled and kicked violently. There was no marked salivation.

The biological examination of one of the brains showed that the animal had developed street rabies, and that the disease had not been set up by the fixed virus inoculated.

BENNETT (S. C. J.). **A Note on the Nature of the Rabies Virus in the Anglo-Egyptian Sudan.**—*Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 123–126.

The author briefly discusses the papers which have appeared regarding the nature or type of the rabies virus occurring in Africa, and particularly in West Africa.

With regard to rabies in the Sudan, the author points out that the virus reaches the Sudan via Kordofan Province, and it must come from Central Africa. It was not an imported strain since the importation of dogs, save from the British Isles, is prohibited.

It is of importance too, in view of the descriptions given of the disease in some instances in West Africa, to note that all cases observed in animals were of the furious type. The diagnosis has been established in a calf, dog, donkey, and camel. Human beings were affected, and though a definite statement cannot be made it is probable that only one strain was involved since all the cases occurred in one district within a period of three months.

Two strains were received and both were passed through rabbits in series until the series broke down. The first strain, from a dog, broke down after the 4th passage, and the second, from a calf, after the 10th.

Negri bodies were found in all rabbits of both series, but these appeared as coccus-like cell inclusions after the second passage. The dog strain was fatal to rabbits in periods ranging from 9 to 29 days. The calf strain was far more regular in its action killing in from 11 to 15 days. In neither case did passage lead to exaltation of virulence.

From these results it would appear that the behaviour of the virus in rabbits should be discarded as an indication of the existence of a special African virus.

BLONDIN, WILBERT (R.) & DELORME (M.). Contribution à l'étude de la rage en A.O.F. [**Rabies in French West Africa.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 404–407.

With a view to adding to existing knowledge regarding the geographical distribution of rabies in French West Africa the authors report cases which have come to their notice.

A survey of existing literature would tend to imply that the distribution of the disease is not even. It appears to be rare in Dahomey and Guinea, and there appear to be no records of it in the Ivory Coast.

In 1918 one of the writers had his own dog become infected, and he gives a detailed description of the clinical symptoms observed.

As means for making a post-mortem examination were not available the diagnosis was based upon the symptoms presented. This case occurred at Ouagadougou.

In 1919 a second case was encountered at Niafunké. This animal was brought in by natives who had killed it. The brain was placed in glycerine and sent to Bamako for diagnosis. A rabbit inoculated subdurally died with paralysis on the 12th day.

A third case was found at Labé in 1925. An inoculated rabbit at the Pasteur Institute at Kindia developed symptoms on the 21st day, and died paralysed on the 23rd day.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. I. Description of the Strain of Virus used. Titration and Centrifugation Experiments.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol 45. No. 4. pp. 673–683.

The strain used was recovered from a cow. It was carried on in series in guineapigs through over 250 passages, and it could be put back through cattle and pigs and again brought to guineapigs. No naturally immune guineapigs were encountered. Intradermal inoculation of the pads was found to be the most certain methods of infection for the production of generalized disease. The virus was active in dilution of 1 in 10,000,000. This shows the minuteness of the active agent and the necessity of special technique. It is also of great importance in connexion with the question of cultivation tests.

A number of viruses were titrated as to the limit of infective dilution, and it was found that the factor between the extremes tested was 25. (1 in 10,000,000; and 1 in 400,000).

The severity of the disease and the period of incubation depended upon the concentration of the virus. The rate and energy of the action is therefore proportional to the concentration. No evidence could be obtained that the virus could be concentrated by centrifugation.

Centrifugation was also used in attempting to free the liquid from a hypothetical body which might be an inhibiting factor in cultures, such as fragments of tissues or cells. No evidence of this was obtained.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. II. Cataphoresis and Filtration.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol. 45. No. 4. pp. 685–699.

Cataphoresis tests showed that in an electric field the virus is electropositive if at a pH below 8 and electronegative if at a pH above 8. At about pH 8 it is isoelectric.

There was the production of a haziness at the pole opposite to that at which the virus accumulated. The virus has an unusually high isoelectric range and is under ordinary conditions electro-positive.

This does not contraindicate a possible protein or living nature, for though bacteria are generally electronegative in charge spirochaetes as a genus and trypanosomes carry positive charges.

The determination of the charge was of the greatest importance in interpreting results of ordinary and molecular filtration experiments, and gave indirectly some indication of the relative dimensions of the causal agent. Seitz, Berkefeld and Chamberland filters of different grades, and Bechhold's ultrafilter with different percentages of acetic collodion were employed.

For reasons given by the authors it cannot be held that the whole of the " incitant " is adsorbed to minute particles of the same size.

Adsorption by filters is due to the fact that all filters carry an electro-negative charge while the virus has an electro-positive one. In some filters the pores are extremely small and the electro-negative charge is very strong. There may, therefore, occur complete adsorption. Counteraction of the adsorption action allows the passage of particles. In this way an estimate can be formed of the size of particles passed by various filters.

Experiments appear to indicate that the active agent of the virus of foot and mouth disease is at least larger than the molecule of haemoglobin, which as computed by Bechhold is 3·6 mμ. Collodion membranes were found unsuitable for the filtration of the virus for more than half the membranes presented recognizable holes before testing, and the authors could not convince themselves that microscopic holes were not absent in the remainder.

But it was found that collodion membranes permeable to colloids containing particles in size of the order of blue litmus and to crystalloids were not permeable to the virus.

Bechhold ultrafilter membranes were found to be satisfactory. These are prepared by impregnating Schleicher and Schüll filter papers with acetic collodion concentrations ranging from 1½ to 7½ per cent. Discs of this kind were used in Seitz filter cups. The discs are electro-negative and to eliminate adsorption virus and test materials were employed in the same condition. The ability of the discs to adsorb a positively charged substance was shown by the adsorption of the electro-positive dye, night blue. The negative pressures used for the filtrations varied with the membranes employed. The results obtained indicate that the size of the virus is relatively between 20 and 100 mμ. The notion of a fluid virus is refuted. The comparative ease with which virus and collargol particles filtered through 1½ per cent. membranes and the difficulty with which colloidal arsenic trisulphide traversed similar discs indicate that the size of the virus may be nearer the minimal than maximal reading.

KII (N.) & KASAI (H.). **On the Ovinised Vaccine.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 159–161. (Authors' English abstract).

Variola vaccine used for the inoculation of sheep in series produces vesicles up to the 8th generation. From the 9th to the 14th generation there is only slight desquamation of the inoculated area. After this there is gradual recovery of virulence which reaches a maximum at the 23rd generation.

Ovinized lymph used for the inoculation of calves produces vesicles up to the 8th generation, and after the 11th none are produced. Completely ovinized lymph is not pathogenic for calves. Similarly the lymph from successive sheep gradually fails to be inoculable to rabbits.

Ovinized lymph of the 20th generation was used for the inoculation of two children who were at the same time done with ordinary lymph. The ordinary lymph produced typical reactions. The ovinized lymph produced none.

Vaccine from early passages of sheep inoculated with variola protects against variola inoculation, but not against ovinized vaccine. That obtained from subsequent generations does not protect against variola but does immunize against sheep-pox.

While ovinized variola vaccine immunises against sheep-pox, the immunity is not strong enough for practical application of the method.

Sheep recovered from sheep-pox are not immune to variola inoculation, but they are to ovinized vaccine.

KII (N.) & KASAI (H.). **Transformation of the Sheep-pox Virus into the Vaccinia Virus by means of Testicular Passage of Rabbits.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 135–136.

This summary of the authors' paper in Japanese states that by passing the sheep-pox virus into the testicle of the rabbit and then maintaining it in rabbits in series, the virus acquires the power of infecting bovines at the 2nd to 4th generation, and that it produces absolutely typical lesions of cow-pox in calves. Further, the lymph collected from calves so infected will produce a typical vaccine reaction in human beings.

Later passage rabbits inoculated with sheep-pox were immune to cow-pox, and calves inoculated with the same virus were also immune.

The passage of the sheep-pox virus through rabbits reduced its virulence for the sheep. Sheep so inoculated could be infected by intravenous inoculation with unchanged sheep-pox virus.

KAKIZAKI (C.), NAKANISHI (S.) & NAKAMURA (J.). **Experimental Studies on the Economical Rinderpest Vaccine.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 107–120.

The authors record the results obtained by using emulsions of different organs as vaccine against rinderpest.

The emulsions were prepared by mixing with glycerine in the proportion of 1 to 2 or 3 and adding 10 per cent. toluol. In some cases the viscosity of this mixture rendered further dilution essential.

The emulsions of the infected organs were tested singly and in combination.

Thymus and tonsil are said to give the best results. Lymphatic glands were inferior to these; spleen gave useful results, but lung was of little or no value.

Doses used ranged from ·005—1 cc. per kwan (3·75 kilos or 8¼ lb.)

MELLO (U.) & POGGIO (C.). La vaccinazione antirabbica dei bovini. [**The Antirabic Vaccination of Bovines.**]—*Annali d'Igiene.* 1927. Jan. Vol. 37. No. 1. pp. 9–27.

MISCELLANEOUS.

COWDRY (E. V.) & MARSH (H.). **Comparative Pathology of South African Jagziekte and Montana Progressive Pneumonia of Sheep.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol. 45. No. 4. pp. 571–585. With 3 plates.

In this paper the authors correlate their findings regarding the two diseases referred to in the title of the paper. The conditions have been investigated independently, but comparison of the results indicate a close similarity.

The paper is based upon the examination of material collected from 33 sheep in South Africa and 46 cases of the American disease.

A long tabular statement draws comparisons between the two conditions, dealing with the epidemiology, symptoms, prognosis, prophylaxis, etiology, and pathology.

The lesions of the two diseases very closely resemble each other. The primary changes occur in the interalveolar tissues of the lungs in a focal manner. There is engorgement of the capillaries and an interstitial accumulation of macrophages and lymphocytes. Exudation of these takes place producing a typical chronic catarrhal pneumonia. At the same time there is a proliferation of the epithelial cells of the alveoli and bronchioles. Subsequently extensive fibrosis takes place. Nothing is known regarding the exact etiology of the diseases, and until that has been settled it cannot be said that they are identical, but it is extremely doubtful whether it is possible to distinguish between them.

MIEGEVILLE. Le pseudo-ecthyma contagieux des lèvres du mouton et de la chèvre et la stomatite contagieuse des agneaux et des chevreaux au Maroc. [**Contagious Pseudo-Echthyma of the Lips of the Sheep and Goat and Contagious Stomatitis of the Lamb and Kid in Morocco.**]—*Rev. Vét. et. Jl. Méd. Vét.* 1927. June. Vol. 79. pp. 313–319.

1. *Contagious Pseudo-echthyma of the lips of the sheep and goat.*

This condition is characterized by the formation of greyish white false membranes on the lips and gums. The membranes form small circular patches surrounded by an inflammatory zone.

The author does not consider the condition to be contagious, the occurrence of a number of cases simultaneously being due to a common cause.

The condition is bacterial in origin, but predisposing conditions play a great part in it. Among these the author gives parasitic invasions, which lower bodily resistance, insufficient food, hard, dry food, which injures the mucous surfaces, etc.

Sheep are more susceptible than goats, and both sheep and lambs are equally affected. Among the latter the disease is more serious and, the author thinks, actually becomes contagious.

2. *Contagious Stomatitis.* This disease is more common and more serious than the foregoing, and it is generally contagious. Miegeville looks upon the condition as in reality a general disease which has a principal localization on the mucous membranes. The cause of this condition has not been definitely established. When first observed

the lesions present themselves as whitish patches on the mucous membrane of the mouth. These have a tendency to spread and coalesce. If such necrotic looking lesions are detached a raw surface is exposed. Not infrequently the lesions extend to the outer surfaces of the lips where they become covered with brownish crusts. In very severe cases practically the whole of the mucous surface of the mouth may be involved and there may be gangrene of the tongue.

That there is general disturbance of health is shown by the fact that there is fever and diarrhoea. In occasional cases death may occur within a few days, as if the disease were actually a septicaemia. More generally the course of the disease is slower, and death results from inanition.

At the post-mortem examination there is gastro-enteritis with, not infrequently, ulceration of the bowels. The liver may contain miliary abscesses, as may also the lungs. Portions of the lung are sometimes gangrenous. There may be peritonitis, and abscess formation may occur in the lymphatic glands.

Control of the disease follows general lines. A very careful watch must be kept for fresh cases and strict isolation of the sick must be practised. Local treatment consists in antiseptic dressings to the discoverable lesions.

BULL (L. B.). **Notes on Swelled-Head or Big-Head in Rams with a Discussion on Photosensitization.**—*Australian Vet. Jl.* 1927. June. Vol. 3. No. 2. pp. 53–59. With 4 text-figs.

According to a sheep-station manager of experience big-head attacks only an occasional sheep and such animals die. There is no evidence of disease in the internal organs. It occurs only during the later summer months. The swelling begins at the face and lips and gradually extends. Death is due to suffocation from closure of the nostrils. The swelling is generally bilateral, but in some cases it begins unilaterally and then extends to the opposite side.

The condition has been known in New South Wales for some years, but it has only recently been detected in Western Australia. It appears to be unknown in Queensland. It attacks rams only and may occur at any age, but it is most frequently seen at one year. It has been held to be associated with lucerne feeding, but the writer has encountered it in animals that have not had lucerne. Similarly, it has been believed to be confined to merinos, but cases in both a Dorset and a Suffolk ram are known.

In seasons when the disease occurs a number of cases may follow the first one, but it may not appear for several seasons in succession. The incidence seldom exceeds 5 per cent. of the rams. When the swelling is extensive death usually occurs in about 48 hours, but there are undoubted mild cases in which recovery takes place.

Post-mortem examination reveals the presence of a clear liquid in the subcutaneous tissues. This clots readily on exposure. No oedema of the tongue or glottis has been noted, but the mucous membrane of the turbinated bones is congested and swollen. Hydrothorax is generally present.

Nothing has been discovered regarding the etiology of the condition, but attention is drawn to the resemblance it bears to photosensitization.

STURGESS (G. W.). **Osteitis Febrosa (Osteoporosis).**—*Administ. Rept. Govt. Veterinary Surgeon.* 1926. Colombo: Govt. Printer. 1927. pp. 3–4.

Under the heading "Miscellaneous" the Government Veterinary Surgeon reports a tentative experiment designed to supply information regarding the following points:—

1. Could osteitis fibrosa develop without contact, either direct or indirect, with pre-existing cases?
2. The influence of feeding upon the production of the disease.

Six ponies were obtained from Delft Island, off the north-west coast of Ceylon. Pony breeding has been carried on there for over 100 years, but no case of the disease has ever been noted. Every step was taken to prevent contact of any sort with other equines, and the boats and vehicles used for transport had not been used for horses.

At Colombo the ponies were housed in stables which had not been used for six months and which had recently been cleansed and lime-washed. They were kept here for two months and then taken to the Government Dairy, Colombo, where no horses were kept. When the experiment was begun the ponies had been under observation for three months and all appeared to be perfectly healthy.

The ponies received different diets designed to contain varying amounts of calcium and phosphoric acid, and with adequate amounts of protein, fats, and carbohydrates. The vitamin content also varied.

The animals were housed under one roof separated from each other only by bamboo poles. As they were unbroken they could only be exercised by lunging. They were all of the same sex and approximately of the same age. Diet was the only difference in treatment. At the time of writing the experiment was not complete, but certain tentative conclusions appeared to be justified. Four of the ponies had developed the disease. The vitamin requirements of horses appear to be very low, and their presence or absence does not seem to be related to the occurrence of the disease. A pony on bran with 2 ounces of sterilized bone meal daily remained healthy and improved in condition, while one receiving bran and 10 lb. of fresh green grass daily developed the disease. Bran is deficient in vitamins A and B, and C is absent. The bone meal was autoclaved at 125° C. four hours on two days before feeding and apparently contained no vitamin.

Guineapigs fed upon this diet died in less than a month.

The calcium oxide requirement of ponies appears to be about 20 grammes a day, but if there is an excess of phosphoric acid in the diet this amount is insufficient. A deficiency of calcium appears to be a causal factor, particularly when there is an excess of phosphorus.

A full report is promised.

DELORME (M.). Association fuso-spirillaire (ulcère phagédénique tropical) chez le chien. [**Fuso-Spirillary Association in a Dog (Tropical Phagedenic Ulcer).**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 548–553.

A fox terrier bitch at Kindia (French Guinea) developed an ulcerating lesion on the abdominal wall just in front of the pubis. This lesion had a prominent rim, and its base was covered with a greyish diphtheroid membrane. Microscopic examination showed *Bacillus fusiformis* and *Sp. vincenti*. As stovarsol and novarsenobenzol were not available "189"

(aminophenolarsenate of soda) was used in powder form to dust over the lesion after thorough cleansing. This caused some amount of pain. At the same time 0·25 g. of the drug was injected subcutaneously into the flank. The local dressing was repeated daily for a week, and this effected a vast improvement in the condition of the wound. A second injection of "189" was given, the dose being 35 cg. and this effected a cure. A third dose of 50 cg. was given, however, as a prophylactic.

ALLEN (H.). **Heat-Stroke and Heat-Syncope.**— *Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 120–22.

Pathological effects of high temperature are only evident when there is a marked amount of atmospheric humidity. In heat-stroke there is extremely high fever, and in heat-syncope symptoms of collapse and low body temperature occur.

It is the heat rays and not the ultra-violet rays which cause ill-effects.

In cases of death from heat-stroke the essential pathological change is the partial coagulation of the globulin found in the cells of the body. This takes place in voluntary and cardiac muscle and causes respiratory and cardiac failure, while later changes occur in the nerve cells.

The general symptoms are a loss of appetite, progressive dullness, depression, fixed eyes, dilated pupils, laboured and accelerated respiration, and in some cases epistaxis. The mucous membranes in the early stages are congested. Later they become paler and may assume a yellowish tinge. The temperature may be 106–107°, but this under treatment may fall in a few days. In one case observed there was laminitis in all four feet. Sometimes inco-ordination of the hind-quarters develops.

A liberal supply of water and green food with some bran was given. Enemata of cold water appeared to be valuable.

If the high temperature persisted hydrobromate of quinine was injected, and camphorated oil similarly injected was used as a cardiac stimulant.

WOLLMAN (E.). Recherches sur la bactériophagie (phénomène de Twort-d'Herelle). [**The Bacteriophage (the Twort-d'Herelle Phenomenon).**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 883–918. With 6 text figs.

This paper comprises two main sections dealing respectively with (1) The properties of the bacteriophage; and (2) the modifications in bacteria which have been acted upon by the bacteriophage; and resistant bacteria. The author sums up the facts which have to be explained and then deals with the theories that have been formulated to furnish the explanations.

Experiments in which extreme dilutions of the bacteriophage are mixed with very weak suspensions of susceptible organisms supply evidence in favour of the corpuscular or "discontinuous" nature of the bacteriophage. Further evidence in the same sense is furnished by the phenomenon of sterile areas in surface cultures, particularly when these are done in series, the number of sterile areas being proportional to the dilution of the bacteriophage. The number of corpuscles

of bacteriophage cannot, however, be deduced because the same dilutions acting upon different susceptible organisms produce different results.

Experiments with anti-shiga and anti-typhoid bacteriophages show that in heterologous mixtures the action is less pronounced than in homologous mixtures. This is shown by working down to the minimum effective dilution. Passage of the bacteriophage with a heterologous organism does not alter its titre for that organism, but it reduces it for the homologous organism.

The size of the bacteriophage corpuscles is a matter regarding which there has been considerable dispute. But there is agreement among some investigators that some portion of the bacteriophage can pass through certain collodion filters. There is, however, considerable loss. The filters used are impermeable to serum proteins and to haemoglobin.

The study of the antigenic properties of the bacteriophages has yielded some interesting results. BORDET and CIUCA showed that it was possible to obtain an antibacteriophage serum. It was subsequently shown by a number of investigators that only an antibacteriophage serum could neutralize the bacteriophage, anti-bacterial sera, prepared with the same organism being without effect. In fact, experiments indicate that the bacteriophage antibody has no affinity whatsoever for the normal bacterial substance, nor has an anti-bacterial serum any anti-bacteriophage properties.

The sum of these observations goes to show that the bacteriophages are new antigenic entities which do not exist in normal bacteria.

Lysis, while it is the most striking phenomenon connected with the action of bacteriophage, is not the only evidence of its effects. Bacteria may grow normally in the presence of bacteriophage, and on the other hand lysis having been primed, so to speak, by bacteriophage or some other mechanism, may continue without its intervention and without any increase in the lytic titre.

Alterations in morphological and biological characters may result from the action of bacteriophage, and among the most important of these is the development of resistance to the bacteriophage, but by colony selection, say, of cultures of *B. coli*, cultures resistant to the bacteriophage can be obtained without the intervention of that principle.

The author describes a number of cross-agglutination tests carried out with various lytic and non-lytic antisera, and resistant and non-resistant strains of organisms and finds that the change in the organisms which produces the condition of resistance to lysis is very irregular in its effects upon the morphological and biological characters of the organisms.

The objections that the author raises to the parasitic theory of bacteriophage are as follows: Their behaviour in the presence of certain physical and chemical agents. Their constant presence in septic media in which many bacteria of the same group or sensitive bacteria are present, but in which the sensitive bacteria themselves may be absent. Their definite inactivation by antibacteriophage sera. The conditions of reproduction of the bacteriophage which require the presence not only of living bacteria, but bacteria which are actively multiplying. The reappearance of bacteriophages in cultures which have appeared free from them for some generations.

Most other theories regarding the nature of bacteriophage envisage it as either a derivative of the bacteria themselves, or as diastases. That is to say, these theories support the view of autogenous development. But the question is not yet settled.

The author puts forward the theory of " Hereditary Factors."

Work of recent years has lent support to the view that acquired characters may be transmitted, and the accurate forecasts possible upon a mendelian basis indicate that some " representative particles " or " factors " must be the vehicles for such characters. He appears to view the independent existence of these " factors " as a possibility.

He quotes the experimental production of the phenomenon of paragglutination *in vitro*, the transference of the thermo-agglutination from one species of bacterium to another, and other phenomena as being examples of extra-cellular transference of characters through the medium of factors.

SMYLY (H. Jocelyn). **The Administration of Tartar Emetic by Various Routes.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 171–178.

Experiments are recorded in which different routes of administration of tartar emetic to infants were tried. In infants the intravenous route is impossible.

Rectal administration was found to fail, because the drug is absorbed in amounts that are insufficient to effect a cure, but in amounts which may result in making the parasite resistant to it.

The objections to intra-muscular injection are that it is painful and causes necrosis.

One case is recorded in which a cure was effected in a child six months old by intraperitoneal injection.

Special emphasis is laid upon the necessity of observing every possible precaution against accidental contamination of the liquids or instruments used. A technique which would lead to no ill-effects in intravenous injection might lead to serious consequences in intraperitoneal injection.

Injections are made in the middle line just below the umbilicus because the peritoneum is here firmly adherent, and should an adhesion form between a loop of bowel and the abdominal wall this will not have time to organize firmly because injections are made at intervals of two days.

Chemically pure sodium antimonyl tartrate in 2 per cent. solution in sterile double-distilled water is used.

In the case of the child the dose was 12 mg. of the drug and the amounts of solution containing this was mixed with 60 cc. of 0·02 per cent. saline solution and injected with a syringe. The fluid was injected as the needle penetrated the peritoneum so as to push the bowel out of the way. The injections were repeated thrice weekly for two months and the total amount of the sodium antimonyl tartrate given was 264 mg.

LANDSTEINER (K.) & VAN DER SCHEER (J.). **Experiments on the Production of Wassermann Reagins by Means of Trypanosomes.**—*Jl. Exp. Med.* 1927. Mar. 1. Vol. 45. No. 3. pp. 465–481.

The authors found that the injection of dead trypanosome suspensions into rabbits caused the sera of these animals to become strongly

Wassermann positive. A number of questions regarding the mechanism of the reaction still await solution, but it appears to be likely that the antigenic activity of the microbes or their products plays a part in the production of the Wassermann reagins in infections with spirochaetes and trypanosomes.

KOUWENAAR (W.). **Intoxication by Carbon Tetrachloride.**—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. pp. 1001–1009. With 1 plate.

The author records some of his experiences in the treatment of human beings with carbon tetrachloride and comes to the conclusion that it is not a safe remedy. He is unable to offer any explanation of the apparent variations in the toxic effects, but is inclined to think that indulgence in alcohol is to some extent to blame.

JONES (F. S.) & LITTLE (R. B.). **The Bactericidal Property of Cow's Milk.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 319–335. With 1 chart in text.

As a result of their experiments the authors find, in agreement with others, that milk does possess the power of inhibiting the growth of certain organisms for more or less definite periods. Their tests were carried out with a non-haemolytic mastitis streptococcus isolated in 1917 and since then kept on horse-blood agar or on plain agar. The bactericidal action of the milk was tested with samples from four groups of cows. The first group comprised cows which had been in the herd for many years and had no history of mastitis. These were classed as resistant. The second group had been injected four times with killed cultures of mastitis streptococci. The third was composed of young animals at their first lactation, and the fourth had had many attacks of mastitis. The findings were the same in all the groups. The inference therefore is that the property is an inherent one. As the bacterial flora of the normal udder is a strictly limited one, and as bacteria have numerous opportunities of gaining access to the udder via the teats it may be held that the property is of practical importance. The property survives in drawn milk for periods ranging up to about 8 hours. With a calf sucking the udder would be emptied at intervals less than this, and it is possible that the usual 12-hour interval between milkings in dairies may render the property inoperative to an important extent.

The observations made appear to suggest that the property or substance is not of blood origin. That it is not blood alexin is indicated by the fact that whereas alexin is destroyed by an exposure to 56° C. for 20 minutes, milk may be heated to 62° C. for the same period without destroying its inhibitory power. In fact, it is not completely inactive at 65° or 70° C. The authors' experiments suggest that the substance is developed within the udder, and that it is not in the nature of a specific antibody since by incubating raw milk with one organism the inhibiting power for another may be absorbed.

MAGALHÃES (O.). Peste dos "Polmões." [**Abscess Disease.**]—*Mem. Inst. Oswaldo Cruz.* 1926. Vol. 19. No. 2. pp. 227–230. With 4 plates.

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